

## LA-UR-12-20042

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Title:	Development of a SQUID-based $^3\text{He}$ Co-magnetometer Readout for a Neutron Electric Dipole Moment Experiment
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Intended for:	Applied superconductivity conference, 2012-10-07/2012-10-12 (Portland, Oregon, United States)



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**Title:**

**Development of a SQUID-based  $^3\text{He}$  Co-magnetometer Readout for a Neutron Electric Dipole Moment Experiment**

**Author:**

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A discovery of a permanent electric dipole moment (EDM) of the neutron would provide one of the most important low energy tests of the discrete symmetries beyond the Standard Model of particle physics. A new nEDM search, to be conducted at the Spallation Neutron Source (SNS) at ORNL, is designed to improve the present experimental limit of  $10^{-26}$  e·cm by two orders of magnitude. The experiment is based on the magnetic-resonance technique in which polarized neutrons precess at the Larmor frequency when placed in a static magnetic field; a non-zero EDM would be evident as a difference in precession frequency when a strong electric field is applied parallel vs. anti-parallel to the magnetic field. In addition to its role as neutron spin-analyzer via the spin-dependent  $n+^3\text{He}$  nuclear capture process, polarized helium-3 (which has negligible EDM) will serve as co-magnetometer to correct for drifts in the magnetic field. The helium-3 precession signal will be read out by SQUID gradiometers, with a noise requirement of  $<1$  fT/Hz $^{1/2}$  (referred to a half-gradiometer). We describe efforts to implement the SQUID system into the large, complex, nEDM cryostat.